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# UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))

Attorney Docket No. 13661-107  
First Inventor or Application Identifier Steven V. Larson  
Title DOOR AND FRAME FOR AIR HANDLING UNIT  
Express Mail Label No. EI294195051US

## APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents

1. ☒ \* Fee Transmittal Form (e.g., PTO/SB/17)  
(Submit an original and a duplicate for fee processing)
2. ☒ Specification [Total Pages 10]  
(preferred arrangement set forth below)
  - Descriptive title of the Invention
  - Cross References to Related Applications
  - Statement Regarding Fed sponsored R & D
  - Reference to Microfiche Appendix
  - Background of the Invention
  - Brief Summary of the Invention
  - Brief Description of the Drawings (if filed)
  - Detailed Description
  - Claim(s)
  - Abstract of the Disclosure
3. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets 7]
4. Oath or Declaration [Total Pages 1]
  - a. ☒ Newly executed (original or copy)
  - b. ☐ Copy from a prior application (37 C.F.R. § 1.63(d))  
(for continuation/divisional with Box 16 completed)
    - i. ☐ DELETION OF INVENTOR(S)  
Signed statement attached deleting  
inventor(s) named in the prior application,  
see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).

\* NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY  
FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT  
IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

ADDRESS TO: Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

5. ☐ Microfiche Computer Program (Appendix)
6. Nucleotide and/or Amino Acid Sequence Submission  
(if applicable, all necessary)
  - a. ☐ Computer Readable Copy
  - b. ☐ Paper Copy (identical to computer copy)
  - c. ☐ Statement verifying identity of above copies

## ACCOMPANYING APPLICATION PARTS

7. ☒ Assignment Papers (cover sheet & document(s))
8. ☐ 37 C.F.R. § 3.73(b) Statement ☐ Power of  
(when there is an assignee) Attorney
9. ☐ English Translation Document (if applicable)
10. ☐ Information Disclosure ☐ Copies of IDS  
Statement (IDS)/PTO-1449 Citations
11. ☐ Preliminary Amendment
12. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)
13. ☒ \* Small Entity ☐ Statement filed in prior application,  
Statement(s) Status still proper and desired  
(PTO/SB/09-12)
14. ☐ Certified Copy of Priority Document(s)  
(if foreign priority is claimed)
15. ☒ Other: Transmittal Cover Letter  
with Certificate of  
Express Mailing

16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. /

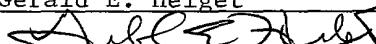
Prior application information: Examiner Group / Art Unit.

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

## 17. CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label or ☒ Correspondence address below  
(Insert Customer No. or Attach bar code label here)

Name	Gerald E. Helget RIDER, BENNETT, EGAN & ARUNDEL				
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Name (Print/Type)	Gerald E. Helget	Registration No. (Attorney/Agent)	30,948
Signature		Date	3/3/2000

Burden Hour Statement This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

03-06-00

A

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re. Appln.: Steven V. Larson  
Serial No.: Not yet assigned  
Filed: March 3, 2000  
For: DOOR AND FRAME FOR AIR HANDLING UNIT  
Attorney: Gerald E. Helget  
Attorney  
Docket No.: 13661-107  
Additional Fees: Charge to Deposit Account 50-1188

BOX PATENT APPLICATION  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

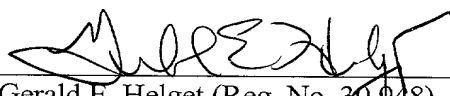
TRANSMITTAL COVER LETTER

Enclosed for filing, please find the following:

1. Utility Patent Application Transmittal;
2. Fee Transmittal for FY 2000;
3. Specification, claims and abstract;
4. Seven (7) sheets of informal drawings;
5. Declaration and Power of Attorney for Original Application;
6. Small Entity Verified Statement;
7. Check in the amount of \$345.00;
8. Recordation Form Cover Sheet, Assignment and check in the amount of \$40.00 for filing; and
9. Postcard receipts.

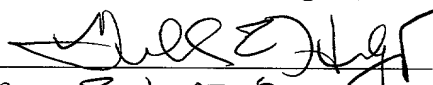
Respectfully submitted,

Dated: 3 MAR 00

  
Gerald E. Helget (Reg. No. 30,948)  
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2000 Metropolitan Centre  
333 South Seventh Street  
Minneapolis, MN 55402  
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CERTIFICATE OF EXPRESS MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail, Receipt No. EI294195051US, in an envelope addressed to BOX PATENT APPLICATION, Assistant Commissioner for Patents, Washington, D.C. 20231, on the date indicated below.

By   
Date 3 MAR 00

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Re. Appln.: Steven V. Larson  
Serial No.: Not yet assigned  
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Docket No.: 13661-107  
Additional  
Fees: Charge to Deposit Account 50-1188

BOX PATENT APPLICATION  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

**SMALL ENTITY VERIFIED STATEMENT AND DECLARATION**  
**BY SMALL BUSINESS CONCERN**

A small entity status is hereby established in the application for the U.S. Patent herein identified for purposes of paying fees, as follows:

The small business concern identified below makes the following verified statement on behalf of said small business concern: (1) avers that exclusive rights to the invention have been conveyed to and remain with said small business concern; (2) avers that said concern qualifies as a small business concern as defined in 37 CFR § 1.9(d), and especially that the number of employees (as defined in said § 1.9(d) of said concern including those of its affiliates (as defined in § 1.9(d)) if any, does not exceed 500 persons; (3) also avers that said concern has not assigned, granted, conveyed or licensed, and is under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any other person or concern; and (4) and is signed by the owner or an official of said small business concern empowered to act on behalf of the concern.

Name of Concern: A.J. Manufacturing, Inc.  
Address of Concern: 1217 Oak Street  
Bloomer, Wisconsin 54724

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date 2-14-00

By Dale L. Hanson  
Dale L. Hanson  
Vice President

#487522 v1 - Small Entity - A J Mfg

[illegible]

Invention : DOOR AND FRAME FOR AIR HANDLING UNIT

## BACKGROUND OF THE INVENTION

Many commercial buildings have air handling units, usually placed on the roof of the building. An air handling unit of the prior art is generally shown in Fig.1.

As can be seen, a typical air handling unit includes an enclosure E with one or more doors D to allow personnel to gain access to the machinery inside the enclosure.

The air handling unit enclosure typically encloses heating, ventilation and air conditioning equipment (HVAC). Because the HVAC equipment is used to maintain the building's temperature, it is important that the enclosure E and doors D of the air handling unit do not allow the passage of air into or out of the air handling unit.

Because of this requirement, the air handling unit must be able to withstand the high external air pressure associated with gale force winds. Furthermore, the air pressure inside the air handling unit is typically lower than ambient air pressure outside the unit (sometimes by as much as six inches), and such a difference in air pressure can cause a pressure differential between the inside and outside of the unit equivalent to up to a 300 mph wind blowing against the unit and its doors. The doors must not leak air, even under such a high pressure.

In addition, the doors of the unit must have thermal insulation to prevent heat exchange between the outside and the inside of the unit.

Typical air handling units of the prior art are capable of withstanding six inches of pressure differential, but this is their limit.

In today's environment, there is a need for high-efficiency cooling in buildings. Such high-efficiency cooling requires a more efficient air handling unit, because colder air within the air handling unit means that less volume of air conditioned air is needed to maintain the building's temperature.

There is a need for a high-efficiency air handling unit with higher structural strength and more efficient thermal properties.

### SUMMARY OF THE INVENTION

A door and frame combination for an air handling unit, the combination comprising:

- (a) a frame;
- (b) a hinged door engaging the frame, the door further comprising a front wall, rear wall, and side walls enclosing a hollow core and insulating material filling the hollow core; and
- (c) a gasket between the door and the frame, the gasket further comprising a flexible gasket wall with anti-roll extensions.

A principal object and advantage of the present invention is that it provides higher structural strength with less door thickness than in previous doors.

Another principal object and advantage of the present invention is that it includes a special gasket which does not roll over when the door closes, thus producing an airtight seal.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an air handling unit of the prior art;

FIG. 2 is a perspective view of the door and frame of the present invention;

FIG. 3 is an elevational view of the door and frame of the present invention;

FIG. 4 is the same as FIG. 3, but also showing an optional window;

FIG. 5 is a cross-section along the lines 5 of FIG. 4;

FIG. 6 is a cross-section along the lines 6 of FIG. 4; and

FIG. 7 is a cross-section of the gasket of the present invention.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The door and frame combination of the present invention is generally shown in the Figures as reference numeral 10.

The door and frame combination 10 comprises a frame 12; a hinged door 14 engaging the frame 12; and a gasket 16 between the door 14 and the frame 12. Optionally, the door may have a window 18 therein.

As may be more particularly seen in Figs. 5 and 6, the door 14 further comprises a front wall 20, rear wall 22, and side walls 24 enclosing a hollow core 26. The hollow core 26 is filled with insulating material 28.

Preferably the insulating material 28 is expanding polyurethane foam. This foam may be obtained readily from several sources, such as Flexible Products Company, 1007 Industrial Park Drive, Marietta, Georgia 30062, whose product is a polymeric diphenylmethane diisocyanate with chlorodifluoromethane.

In the preferred embodiment, the side walls 24 are two inches in width, to produce a door 14 two inches thick.

As can best be seen in Figs. 5 and 7, the gasket 16 comprises a gasket wall 16A with anti-roll extensions 16B. Preferably, the gasket 16 has a hollow core 16C within the gasket wall 16A.

Preferably, the gasket has a friction-reducing material 16D on the gasket wall 16A. The friction-reducing material may be SANTOPRENE® thermoplastic rubber from Advanced Elastomer Systems, L.P., 388 South Main St., Akron, OH 44311; a thermoplastic resin from Minnesota General Polymers, 3500 W. Highway 13, Burnsville, MN 55337 (a propylene-ethylene copolymer); and Pro-Fax polymer (propylene-ethylene copolymer) from Himont, Inc., Three Little Falls Center, 2801 Centerville Rd., Wilmington, DE 19850.



To produce additional protection against leakage of air around the door, the door 14 and frame 12 may have thermal pockets 30 filled with an insulating material, such as high-density polyurethane.

As the door 14 is closed against the frame 12, the anti-roll extensions 16B on the gasket 16 prevent the gasket from being rolled over by the door. This property is assisted by the friction-reducing material 16D on the gasket wall 16A. The result is that the gasket 16 is flattened between the door 14 and the frame 12, producing an air-tight seal.

If R13 polyurethane insulation is used within the hollow core 26 of the door 14, the door need only be two inches thick, rather than four inches, as in previous doors in air handling units. The polyurethane insulation also gives the door 14 rigidity and structural strength. The polyurethane insulation is applied as an expanding foam while the door is under pressure during the manufacturing process. It has been found that approximately eight minutes is required to keep the door under pressure to prevent undue expansion of the foam, followed by twenty-four hours of curing.

The door and frame combination has been tested at up to 14 inches of static pressure without leaking, as compared to six inches of static pressure for previous doors.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being made to the appended claims rather than to the foregoing description to indicate the scope of the invention.

WHAT IS CLAIMED:

1. A door and frame combination for an air handling unit, the combination comprising:
  - (a) a frame;
  - (b) a hinged door engaging the frame, the door further comprising a front wall, rear wall, and side walls enclosing a hollow core and insulating material filling the hollow core; and
  - (c) a gasket between the door and the frame, the gasket further comprising a flexible gasket wall with anti-roll extensions.
2. The door and frame combination of claim 1, wherein the insulating material is expanding polyurethane foam.
3. The door and frame combination of claim 2, wherein the side walls are two inches in width.
4. The door and frame combination of claim 1, wherein the gasket further comprises a central hollow core.
5. The door and frame combination of claim 1, wherein the gasket further comprises a friction-reducing material on the gasket wall.
6. The door and frame combination of claim 1, further comprising thermal pockets on the door and on the frame, the thermal pockets being filled with insulating material.

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9. A door and frame combination for an air handling unit, the combination comprising:

(a) a frame;

(b) a hinged door engaging the frame, the door further comprising a front wall, rear wall, and side walls enclosing a hollow core and insulating material filling the hollow core wherein the insulating material is expanding polyurethane foam; and

(c) a gasket between the door and the frame, the gasket further comprising a flexible gasket wall with anti-roll extensions.

10. The door and frame combination of claim 9, wherein the side walls are two inches in width.

11. The door and frame combination of claim 9, wherein the gasket further comprises a central hollow core.

12. The door and frame combination of claim 9, wherein the gasket further comprises a friction-reducing material on the gasket wall.

13. The door and frame combination of claim 9, further comprising thermal pockets on the door and on the frame, the thermal pockets being filled with insulating material.

14. The door and frame combination of claim 13, wherein the insulating material is high-density polyurethane.

15. The door and frame combination of claim 9, further comprising a window in the door.

16. A door and frame combination for an air handling unit, the combination comprising:

(a) a frame;

(b) a hinged door engaging the frame, the door further comprising a front wall, rear wall, and side walls enclosing a hollow core and insulating material filling the hollow core; wherein the insulating material is expanding polyurethane foam; and

(c) a gasket between the door and the frame, the gasket further comprising a flexible gasket wall with anti-roll extensions, and further comprising a friction-reducing material on the gasket wall.

17. The door and frame combination of claim 16 wherein the gasket further comprises a central hollow core.

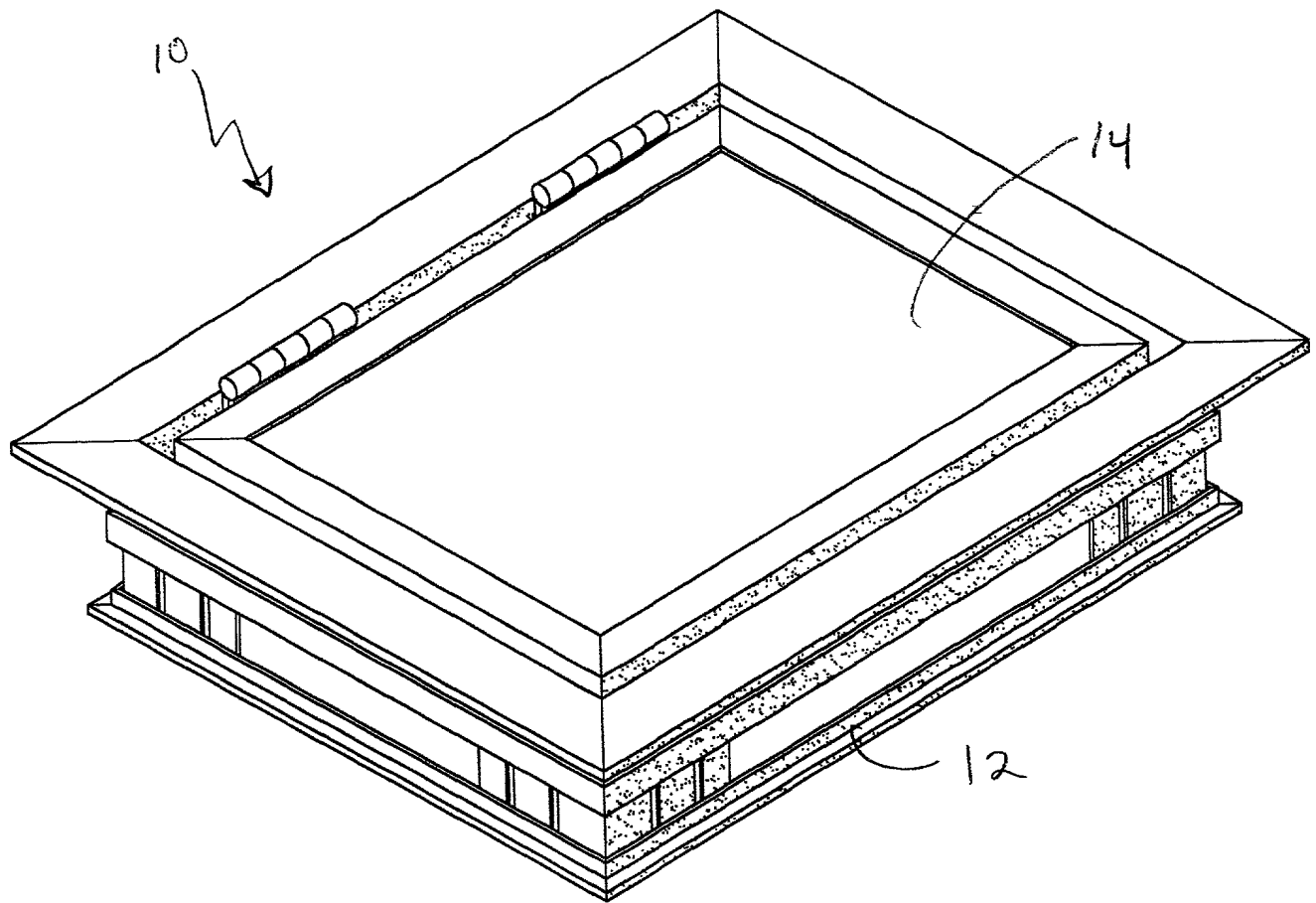
18. The door and frame combination of claim 16, further comprising thermal pockets on the door and on the frame, the thermal pockets being filled with high-density polyurethane.

19. The door and frame combination of claim 16, further comprising a window in the door.

20. The door and frame combination of claim 16, wherein the side walls are two inches in width.



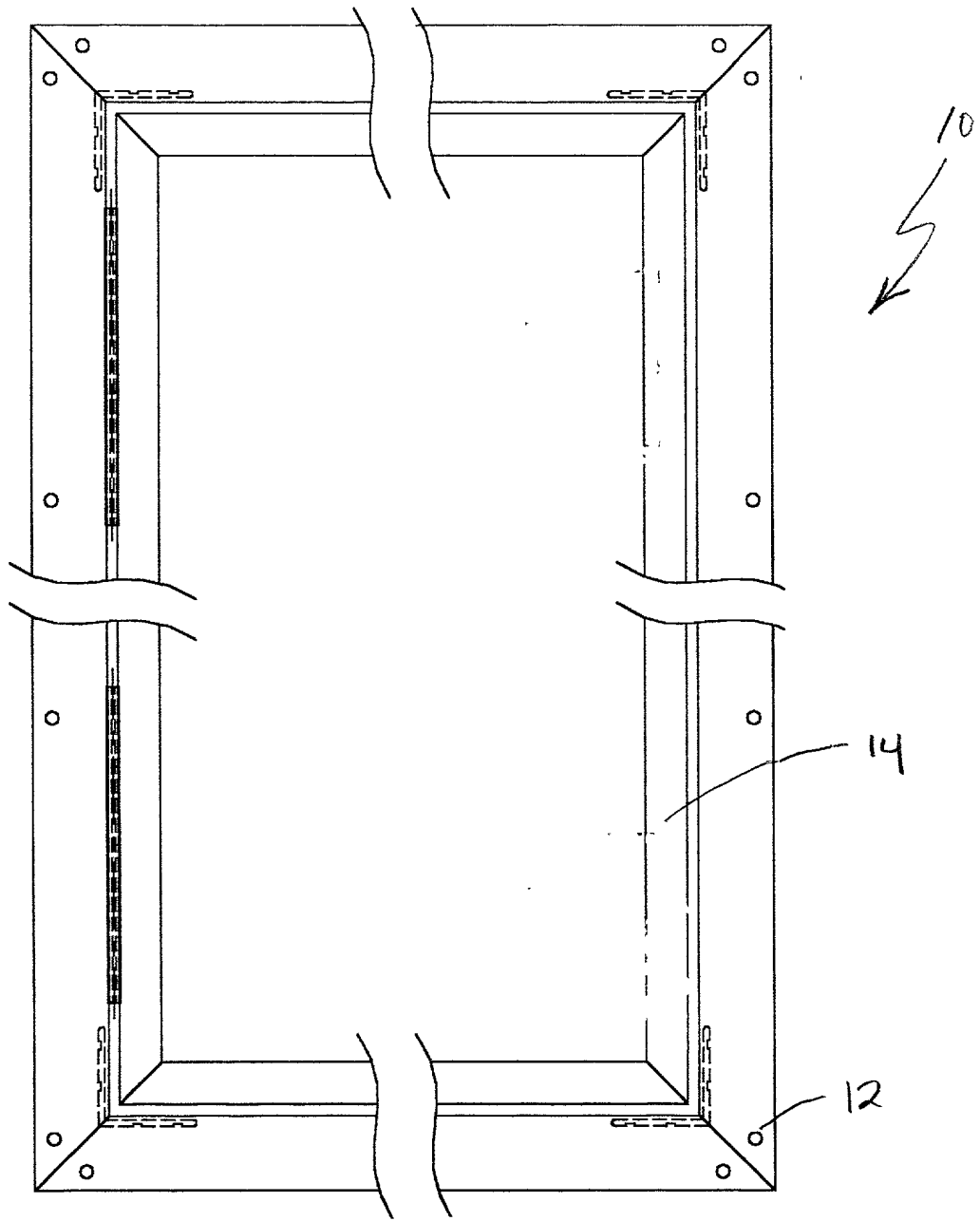
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F16.2



FIG 3



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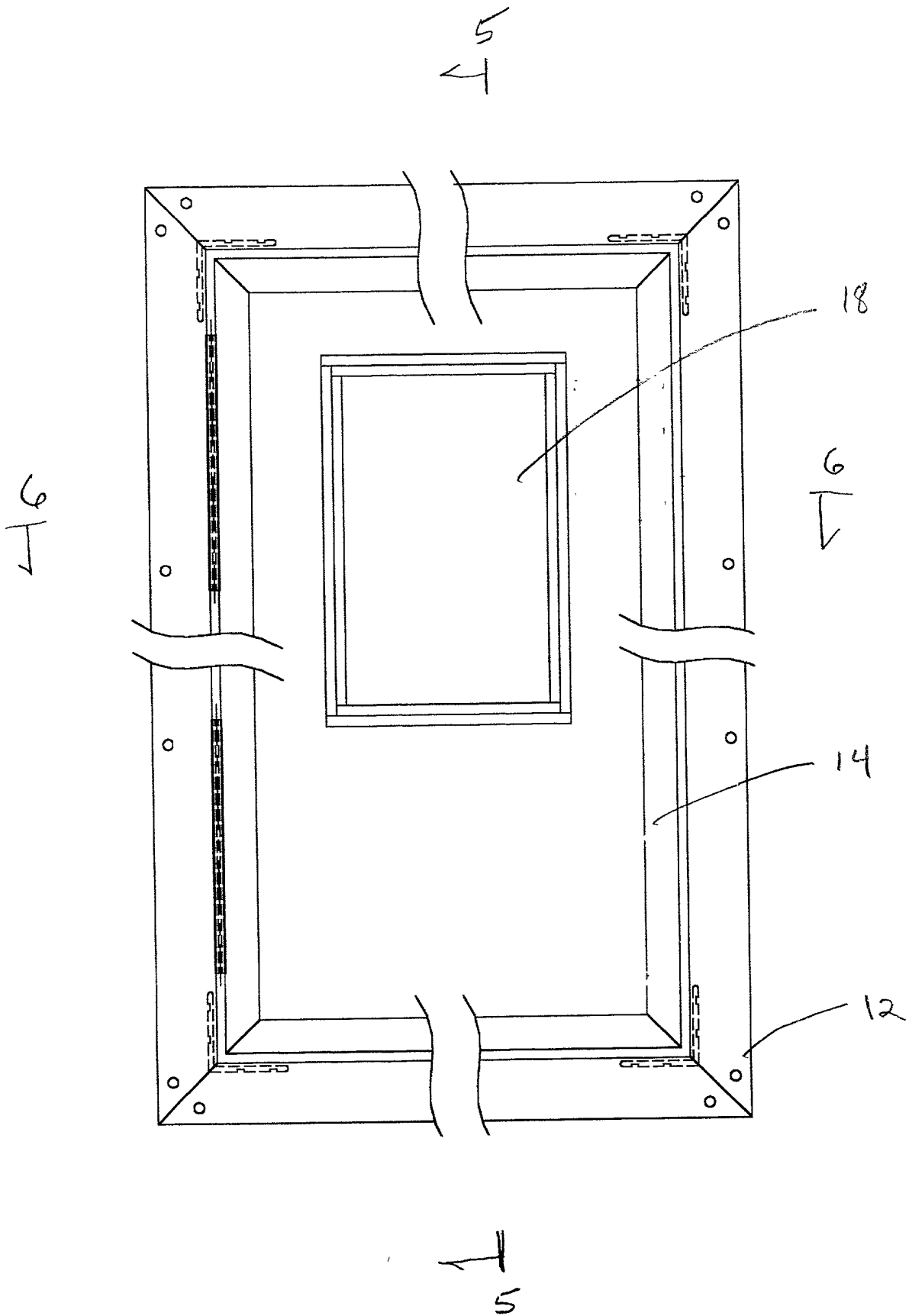
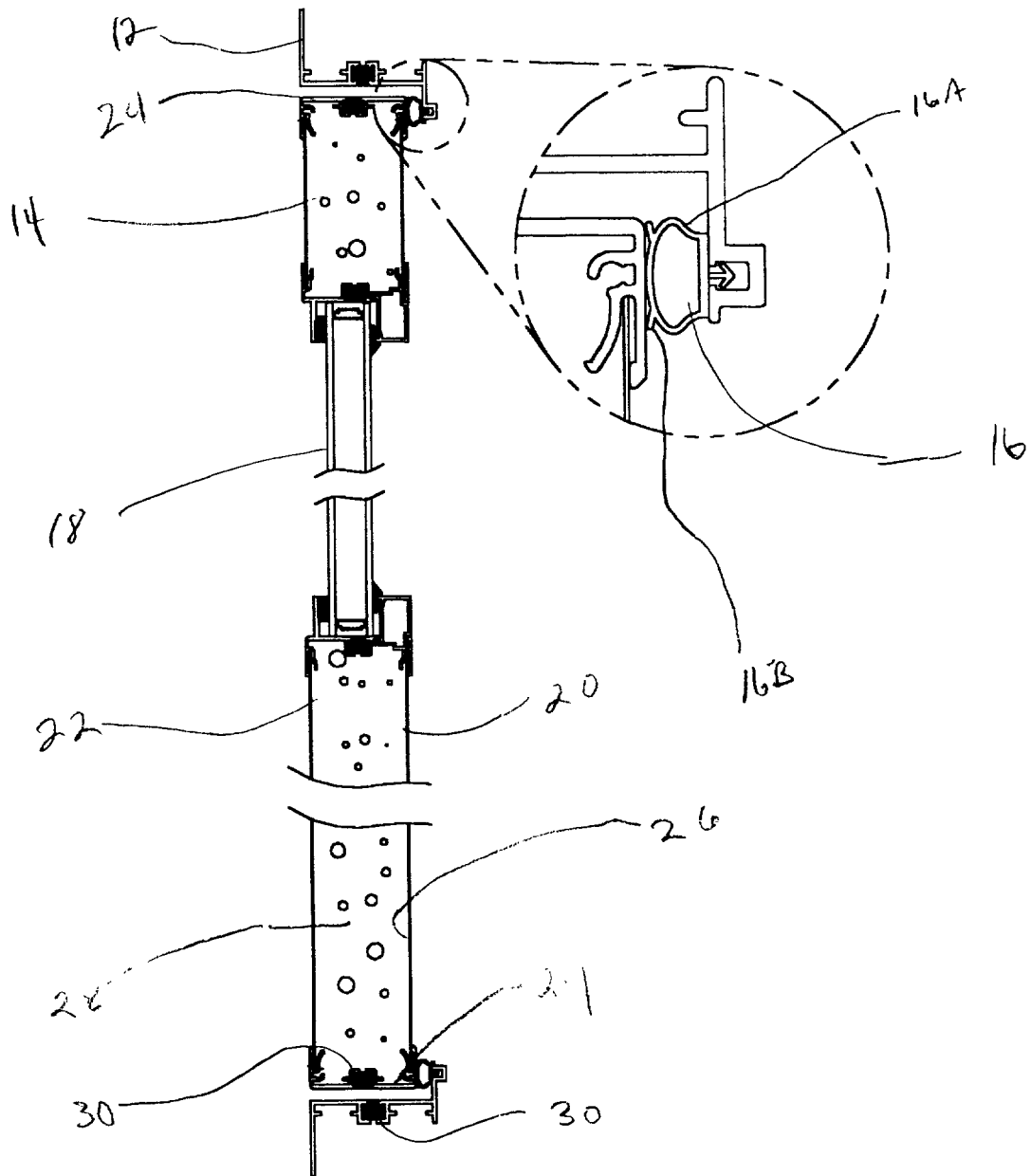


FIG. 4



F16.5

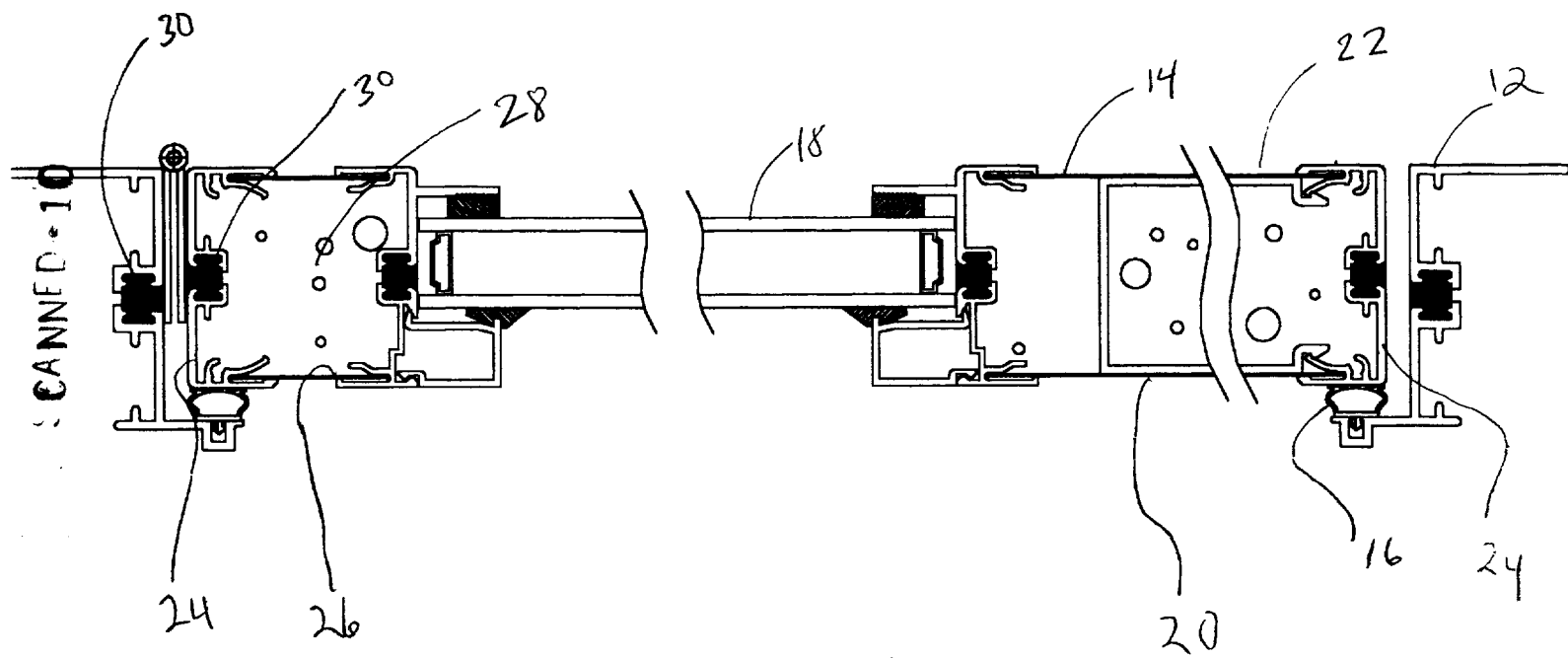


FIG. 6



## DECLARATION AND POWER OF ATTORNEY FOR ORIGINAL APPLICATION

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below my name; and that I believe I am the original and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

DOOR AND FRAME FOR AIR HANDLING UNIT

The specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above-entitled specification, including the claims.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 35 U.S.C. § 120 and Title 37, Code of Federal Regulations, § 1.56(a).

If this application is a continuation, or a continuation-in-part application filed under the conditions specified in 35 U.S.C. § 120 or 37 C.F.R. § 1.53, I acknowledge the duty to disclose to the Patent Office all information known to me to be material to patentability as defined in said § 1.56, which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby appoint the following attorneys to prosecute this application and transact all business in the U.S. Patent and Trademark Office connected therewith: Gerald E. Helget (Reg. No. 30,948) and Nelson R. Capes (Reg. No. 37,106).

Please direct all telephone calls to attorney Gerald E. Helget at (612) 340-8933.

Please address all correspondence to:

RIDER BENNETT EGAN & ARUNDEL  
2000 Metropolitan Centre  
333 South 7th Street  
Minneapolis, MN 55402

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further acknowledge being warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF FIRST INVENTOR IS: Steven V. Larson

INVENTOR'S SIGNATURE Steven V. Larson DATE 2-24-00

Residence Address: 1314 Marquette Avenue, #1707, Minneapolis, Minnesota 55403

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Citizenship: United States of America